

DAFTAR PUSTAKA

- Abd Ghapar, N. F., Abu Samah, R., & Abd Rahman, S. (2020). Pineapple peel waste adsorbent for adsorption of Fe(III). *IOP Conference Series: Materials Science and Engineering*, 991(1), 012093.
- Abd Ghapar, N. F., Abu Samah, R., Abdul Wahab, M. S., Abd Rahman, S., & Othman, M. H. D. (2024). An insight into pineapple peel waste adsorbent for iron contaminated water through kinetic and isotherm study. *Malaysian Journal of Analytical Sciences*, 28(2), 397–411.
- Aktar, J. (2021). Batch adsorption process in water treatment. In *Intelligent environmental data monitoring for pollution management* (pp. 1-24). Academic Press.
- Aljamali, N. M., Khdur, R., & Alfatlawi, I. O. (2021). Physical and chemical adsorption and its applications. *International Journal of Thermodynamics and Chemical Kinetics*, 7(2), 1-8.
- Andryas, M. U. (2017). *Aplikasi kolom adsorpsi menggunakan batu apung Sungai Pasak Pariaman sebagai adsorben untuk menyisihkan besi (Fe), tembaga (Cu), dan boron (B) dari air tanah* (Tugas akhir). Fakultas Teknik, Universitas Andalas.
- Ardiyanti, N. N., Irwan., & Nakoe, M. R. (2026). Effectiveness Of Corn Cob Charcoal Powder To Reduce Iron (Fe) Levels In Dug Well Water East Dulalowo Village. *International Journal of Health, Economics, and Social Sciences (IJHESS)*, 8(2), 1426-1434.
- Atkins, P. W., De Paula, J., & Keeler, J. (2023). *Atkins' physical chemistry*. Oxford University Press.
- Azzahra, C. K. 2026. *Analisis Kinerja Adsorben Serbuk Mahkota Nanas dalam Penyisihan Logam Besi (Fe) dari Air Tanah pada Sistem Batch*. Tugas Akhir. Padang: Departemen Teknik Lingkungan, Fakultas Teknik, Universitas Andalas.
- Badan Standardisasi Nasional. (2009). *SNI 6989.4:2009: Cara uji besi (Fe) dengan spektrofotometer serapan atom (AAS)*.

- Badan Standardisasi Nasional. (2021). *SNI 8995:2021: Metode pengambilan contoh uji air untuk pengujian fisika dan kimia*.
- Brown, P. L., dan Ekberg, C. 2016. *Hydrolysis of Metal Ions*. Vol. 1–2. Weinheim: Wiley-VCH Verlag GmbH & Co. KGaA.
- Cano, F. J., Reyes-Vallejo, O., Sanchez-Albores, R. M., Sebastian, P. J., Cruz-Salomón, A., Hernandez-Cruz, M. C., Montejo-Lopez, W., Gonzalez Reyes, M., Serrano Ramirez, R. P., & Torres-Ventura, H. H. (2025). Activated biochar from pineapple crown biomass: a high-efficiency adsorbent for organic dye removal. *Sustainability*, 17(1), 99.
- Chemerys, V., Baltrenaite-Gedienė, E., Baltrenas, P., & Dobeles, G. (2020). Influence of H₂O₂ modification on the adsorptive properties of birch-derived biochar. *Polish Journal of Environmental Studies*, 29(1), 579-588.
- Cheng, Y., Bartholomew, D., & Qin, Y. (2018). Biology of the pineapple plant. In *Genetics and genomics of pineapple* (pp. 27-40). Cham: Springer International Publishing.
- Dichiara, A. B., Weinstein, S. J., & Rogers, R. E. (2015). On the choice of batch or fixed bed adsorption processes for wastewater treatment. *Industrial & Engineering Chemistry Research*, 54(34), 8579-8586.
- Diez, D. M., Cetinkaya-Rundel, M., & Barr, C. D. (2019). *OpenIntro statistics* (4th ed.). OpenIntro.
- Do, D. D. (1998). *Adsorption analysis: Equilibria and kinetics*. World Scientific.
- Fadillah, G., & Mulia, M. I. (2022). Analisis Paparan Besi dan Mangan Pada Air Tanah terhadap Keluhan Kesehatan Masyarakat Di Desa Lakardowo Kabupaten Mojokerto. *Environmental Pollution Journal*, 2(2).
- Field, A. (2018). *Discovering Statistics Using IBM SPSS Statistics* (5th ed.). SAGE Publications.
- Firmansyah, D., Rumhayati, B., & Masruri (2017). Modification of pineapple leaf cellulose with citric acid for Fe²⁺ adsorption. *International Journal of ChemTech Research*, 10(4), 674-680.
- Fitriani, F., Aprilia, S., Arahman, N., Bilad, M. R., Amin, A., Huda, N., & Roslan, J. (2021). Isolation and characterization of nanocrystalline cellulose isolated

- from pineapple crown leaf fiber agricultural wastes using acid hydrolysis. *Polymers*, 13(23), 4188.
- Food and Agriculture Organization of the United Nations. (2011). *Water quality and pollution control*. In *The state of the world's land and water resources for food and agriculture: Managing systems at risk* (pp. 176–206). FAO & Earthscan.
- Goldstein, J. I., Newbury, D. E., Michael, J. R., Ritchie, N. W., Scott, J. H. J., & Joy, D. C. (2018). *Scanning electron microscopy and X-ray microanalysis*. Springer.
- Gupta, A., Sharma, V., Sharma, K., Kumar, V., Choudhary, S., Mankotia, P., Kumar, B., Mishra, H., Moulick, A., Ekielski, A., & Mishra, P. K. (2021). A review of adsorbents for heavy metal decontamination: Growing approach to wastewater treatment. *Materials*, 14(16), 4702.
- Huda, S., Ratnani, R. D., & Kurniasari, L. (2020). Karakterisasi karbon aktif dari bambu ori (*bambusa arundinacea*) yang di aktivasi menggunakan asam klorida (HCl). *Jurnal Inovasi Teknik Kimia*, 5(1).
- Huff, M. D., & Lee, J. W. (2016). Biochar-surface oxygenation with hydrogen peroxide. *Journal of Environmental Management*, 165, 17-21.
- Hinkelmann, K., & Kempthorne, O. (2005). *Design and analysis of experiments: Volume 2 – Advanced experimental design*. John Wiley & Sons.
- Ismadji, S., Soetaredjo, F. E., Santoso, S. P., Putro, J. N., Yuliana, M., Irawaty, W., Hartono, S. B., & Lunardi, V. B. (2021). *Adsorpsi pada fase cair: Kesetimbangan, kinetika, dan termodinamika*. Universitas Katolik Widya Mandala Surabaya.
- Jia, Y., Shi, S., Liu, J., Su, S., Liang, Q., Zeng, X., & Li, T. (2018). Study of the effect of pyrolysis temperature on the Cd²⁺ adsorption characteristics of biochar. *Applied Sciences*, 8(7), 1019.
- Kementerian Kesehatan Republik Indonesia. (2023). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 2 Tahun 2023 tentang Peraturan Pelaksanaan Peraturan Pemerintah Nomor 66 Tahun 2014 tentang Kesehatan Lingkungan*. Kementerian Kesehatan Republik Indonesia.

- Kurniawan, D. (2024). Kajian Literatur Biosorben Limbah Pertanian Dalam Mengurangi Limbah Logam Pada Lingkungan. *JURNAL TECHLINK*, 8(1), 8-17.
- Kozyatnyk, I. (2016). *Filtration materials for groundwater: A guide to good practice*. IWA Publishing.
- Kozyatnyk, I., & Yakupova, I. (2025). Impact of chemical and physical treatments on the structural and surface properties of activated carbon and hydrochar. *ACS Sustainable Chemistry & Engineering*, 13(8), 2500-2507.
- Martini, S., & Yuliwati, E. (2019). Pengaruh Proses Aktivasi terhadap Kinerja Adsorben Organik Dari Kulit Buah Melon Dalam Menyerap Ion Logam Cr (III) Dari Limbah Cair Industri. *Jurnal Distilasi*, 4(2), 33-40.
- Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of cardiac anaesthesia*, 22(1), 67-72.
- Munira, M., Arman, M., Syarif, T., Gusnawati, G., & Darnengsih, D. (2022). Karakterisasi Dan Modifikasi Karbon Aktif Dari Mahkota Nanas Sebagai Bioadsorben. *Journal of Chemical Process Engineering*, 7(2), 123-129.
- Mohamed, E. A., Selim, A. Q., Ahmed, S. A., Sellaoui, L., Bonilla-Petriciolet, A., Erto, A., Li, Z. C., & Seliem, M. K. (2020). H₂O₂-activated anthracite impregnated with chitosan as a novel composite for Cr(VI) and methyl orange adsorption in single-compound and binary systems: Modeling and mechanism interpretation. *Chemical Engineering Journal*, 380, 122445.
- Octaviani, V., Kadaria, U., & Asbanu, G. C. (2024). Pemanfaatan daun nanas sebagai biosorben untuk perbaikan kualitas air gambut. *Jurnal Teknologi Lingkungan Lahan Basah*, 12(2), 458–465.
- Paudyal, H., Adhikari, S., Ghimire, K. N., Gyawali, D., Upadhyaya, I. R., Dahal, B., & Pokhrel, M. R. (2022). Synthesis, characterization and cation exchange performance of chemically modified pineapple waste biomass for the removal of Fe(II) from water. *Results in Chemistry*, 4, 100608.
- Patel, H. (2021). Comparison of batch and fixed bed column adsorption: a critical review. *International Journal of Environmental Science and Technology*, 19(10), 10409-10426.

- Puspitasari, M., Nandari, W. W., & Hadi, F. (2022). Perbandingan Penggunaan Aktivator NaOH dan KOH pada Pembuatan Karbon Aktif dari Kulit Singkong (Manihot utilissima) Comparison of the Use of NaOH and KOH Activators in the Manufacture of Activated Carbon from Cassava Peel (Manihot utilissima). *Jurnal Teknik Kimia, Fakultas Teknik Industri, UPN "Veteran" Yogyakarta*, 19(2), 58-62.
- Reyra, A. S., Daud, S., & Yenti, S. R. (2017). Pengaruh massa dan ukuran partikel adsorben daun nanas terhadap efisiensi penyisihan Fe pada air gambut. *Jom FTEKNIK*, 4(2), 1–9.
- Rizkyi, I. P., Susatyo, E. B., & Susilaningsih, E. (2016). Aktivasi arang tongkol jagung menggunakan HCl sebagai adsorben ion Cd (II). *Indonesian Journal of Chemical Science*, 5(2) 124-129.
- Rusydi, A. F., Onodera, S.-I., Saito, M., Hyodo, F., Maeda, M., Sugianti, K., & Wibawa, S. (2021). Potential sources of ammonium-nitrogen in the coastal groundwater determined from a combined analysis of nitrogen isotope, biological and geological parameters, and land use. *Water*, 13(1), 25.
- Sahania, R. R., Utubira, Y., & Manuhutu, J. B. (2024). Efisiensi dan Kapasitas Adsorpsi Karbon Aktif dari Kulit Jagung Untuk Menurunkan Kadar Logam Fe. *Molucca Journal of Chemistry Education (MJoCE)*, 14(1), 60-69.
- Sajjadi, B., Zubatiuk, T., Leszczynska, D., Leszczynski, J., & Chen, W. Y. (2018). *Chemical activation of biochar for energy and environmental applications: A comprehensive review. Reviews in Chemical Engineering*. Advance online publication.
- Samuel, H. S., Okino, I. A., Okibe, G., & Etim, E. E. (2024). Sustainable Wastewater Treatment: Recent Progress in the use of Bio-Waste-Derived Adsorbents for Organic Dye Removal. *Asian Journal of Environmental Research*, 1(3), 137-151.
- Satyam, S., & Patra, S. (2024). Innovations and challenges in adsorption-based wastewater remediation: A comprehensive review. *Heliyon*, 10(9).
- Shaibur, M. R., Al Helal, A. S., Sarwar, S., Miah, M. A., Siddique, A. B., Howlader, M., Nova, S. S., & Priyanka, K. A. (2025). Removal of iron, manganese, and arsenic from groundwater by using banana and pineapple peel charcoal:

- evidence from sophisticated techniques. *Cleaner Chemical Engineering*, 100202.
- Samghouli, N., Bencheikh, I., Azoulay, K., Jansson, S., & El Hajjaji, S. (2025). Mechanistic and reactional activation study of carbons destined for emerging pharmaceutical pollutant adsorption. *Environmental Monitoring and Assessment*, 197(3), 259.
- Sazali, N., Harun, Z., & Sazali, N. (2020). A review on batch and column adsorption of various adsorbent towards the removal of heavy metal. *Journal of Advanced Research in Fluid Mechanics and Thermal Sciences*, 67(2), 66-88.
- Shi, D., Yek, P. N. Y., Ge, S., Shi, Y., Liew, R. K., Peng, W., Sonne, C., Tabatabaei, M., Aghbashlo, M., & Lam, S. S. (2022). Production of highly porous biochar via microwave physiochemical activation for dechlorination in water treatment. *Chemosphere*, 309, 136624.
- Sibarani, S. T., Widarti, B. N., & Meicahayanti, I. (2022). Pengaruh suhu dan jenis aktivator pada karbon aktif limbah daun nanas terhadap kadar besi (Fe) dan mangan (Mn) air sumur. *Jurnal Teknologi Lingkungan UNMUL*, 6(2), 34-43.
- Silalahi, S. A. (2022). *Efektivitas mahkota nanas sebagai adsorben menggunakan aktivator KOH untuk penyisihan air limbah industri karet* (Tugas akhir). Program Studi Teknik Lingkungan, Fakultas Teknik, Universitas Batanghari, Jambi.
- Simanjuntak, M., Gultom, J., & Chairuddin. (2020). Study of the utilization of pineapple leaves (*Ananas comosus*) as adsorbent for lowering copper ion content (Cu^{2+}), iron (Fe^{3+}), and zinc (Zn^{2+}) in the water. *Journal of Chemical Natural Resources*, 2(1), 67–72.
- Smith, B. C. (2011). *Fundamentals of Fourier transform infrared spectroscopy*. CRC Press.
- Stuart, B. H. (2004). *Infrared spectroscopy: fundamentals and applications*. John Wiley & Sons.
- Tchobanoglous, G., Burton, F. L., & Stensel, H. D. (2003). Wastewater engineering: treatment and reuse, Metcalf & Eddy Inc. *McGraw-Hill*.

- Thom, P. T., & Thom, B. T. (2024). Using Sugarcane Bagasse as an Adsorbent Material to Remove Iron from Water. *International Journal of Environment and Climate Change*, 14(9), 67-76.
- Tran, H. N. (2023). Adsorption technology for water and wastewater treatments. *Water*, 15(15), 2857.
- Wang, B., Lan, J., Bo, C., Gong, B., & Ou, J. (2023). Adsorption of heavy metal onto biomass-derived activated carbon. *RSC advances*, 13(7), 4275-4302.
- Willard, C. A. (2020). Statistical methods: An introduction to basic statistical concepts and analysis (2nd ed.). Routledge.
- World Health Organization. (2022). Guidelines for drinking-water quality: incorporating the first and second addenda. World Health Organization.
- Yuliani, D. D., Fitrilawati, F., & Syakir, N. (2024). Pengaruh pH pada Efisiensi Adsorpsi dan Kapasitas dalam Proses Adsorpsi Rhodamine B oleh Graphene Oxide. *Jurnal Material dan Energi Indonesia*, 14(2), 84-91.
- Yuliusman, Nasruddin, Naf'an, H. I., Sinto, J., & Nugroho, Y. W. (2018). Utilization of crown pineapple waste as raw material preparation of activated carbon as adsorbent in natural gas storage. In *E3S Web of Conferences* (Vol. 67, p. 02018). EDP Sciences.
- Yusuff, A. S., Lala, M. A., Thompson-Yusuff, K. A., & Babatunde, E. O. (2022). ZnCl₂-modified eucalyptus bark biochar as adsorbent: preparation, characterization and its application in adsorption of Cr(VI) from aqueous solutions. *South African Journal of Chemical Engineering*, 42, 138-145.
- Zhou, L., Liu, Y., Liu, S., Yin, Y., Zeng, G., Tan, X., Hu, X., Hu, X., Jiang, L., Ding, Y., Liu, S., & Huang, X. (2016). Investigation of the adsorption-reduction mechanisms of hexavalent chromium by ramie biochars of different pyrolytic temperatures. *Bioresource Technology*, 218, 351–359.
- Zhou, Y., Zhu, Y., & Wong, W. K. (2023). Statistical tests for homogeneity of variance for clinical trials and recommendations. *Contemporary clinical trials communications*, 33, 101119.
- Zilfa, Z., Yusuf, Y., & Syahputra, D. (2024). Penggunaan Zeolit sebagai Adsorben untuk Penjernihan Air Sumur terhadap Kandungan Logam Fe, Nilai BOD,

COD, dan TSS di Kelurahan Kampuang Jua Nan XX, Kecamatan Lubuk Begalung, Kota Padang. *Jurnal Kimia Unand*, 13(2), 24-33.

